

**Acute Gastrentrotis Outbreak Associated with an Elementary School –  
Reno County, April 2008**



Investigation By:

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## **Background**

On April 25, 2008, staff from the Reno County Health Department (RCHD) notified the Office of Surveillance and Epidemiology (OSE) at the Kansas Department of Health and Environment (KDHE) about a possible food borne outbreak at Haven Elementary School in Reno County. Approximately 75 out of 268 students were reported to have diarrhea, vomiting, nausea, abdominal cramps or fever starting on Wednesday, April 23 and Thursday, April 24.

Staff at KDHE and RCHD initiated an outbreak investigation to determine the source of illness and implement appropriate control measures.

## **Methods**

### *Epidemiologic*

Haven Elementary gave investigators the school breakfast and lunch menus for Friday, April 18 through Thursday, April 24. Epidemiologists at KDHE developed a questionnaire to collect information on classroom, food history, afterschool activities and other family members who became ill. The paper-based survey was sent home with the children and collected the next day.

### *Environmental*

On Friday, April 25, inspectors from the KDHE Bureau of Consumer Health (BCH) inspected the kitchen at Haven Elementary school. The same day RCHD conducted the Annual School Sanitation Inspection Report. No food workers completed a food worker survey, but workers were asked about illness.

### *Laboratory*

Staff at RCHD asked ill students and staff if they would be willing to submit a stool sample. Two stool specimens were collected by the RCHD and submitted to the KDHE laboratory for testing.

## **Results**

### *Epidemiologic*

Enrollment at Haven elementary is 268 students in grades kindergarten through sixth. Questionnaires were completed by 110 (41%) students and two teachers. Parents of 13 additional children requested that their student not participate in the study. Of the 110 students and two teachers who completed the questionnaire, 51 students reported becoming ill. No teachers reported becoming ill. To help define the outbreak, a case definition of vomiting and/or diarrhea from Monday, April 22 to Friday, April 25 was established. Of the 51 who reported becoming ill, 34 met the case definition of vomiting and/or diarrhea. Among the 17 who did not meet the case definition, symptoms included stomach cramps, fever, nausea and headache.

No food workers reported being ill.

Table 1 shows the characteristics of those who met the case definition and completed a survey. Those who did not complete a survey are not included in the table. There were an equal number of females and males who became ill, although more females completed surveys. Of those who completed a survey, the fifth grade had the highest number of students ill with 10 of those who completed a survey meeting the case definition. Kindergarten and the fifth grades had the highest percent of ill among those who completed surveys with 40% of each meeting the case definition.

**Table 1. Characteristics of students and teachers who met the case definition and completed the survey**

	Surveys Completed	Cases	
	n	n	%
<b>Gender</b>			
Female	63	17	27
Male	48	17	35
<b>Age (years)</b>			
Median Age	10	10	--
Age Range	5 – 37	5 – 13	--
<b>Grade/ Occupation</b>			
Teachers	2	0	0
Kindergarten	10	4	40
1st Grade	15	3	20
2nd Grade	7	1	14
3rd Grade	21	8	38
4th Grade	14	5	36
5th Grade	25	10	40
6th Grade	17	3	18
No Grade Given	14	0	0

The epidemiologic curve (Figure 1) shows the onset of illness and symptoms for the cases associated with the outbreak. The most common date of onset was Wednesday, April 23, with 12 (35%) cases. Given the shape of the curve and the short incubation period, some of the cases could potentially be secondary cases suggesting a person to person transmission rather than point source.

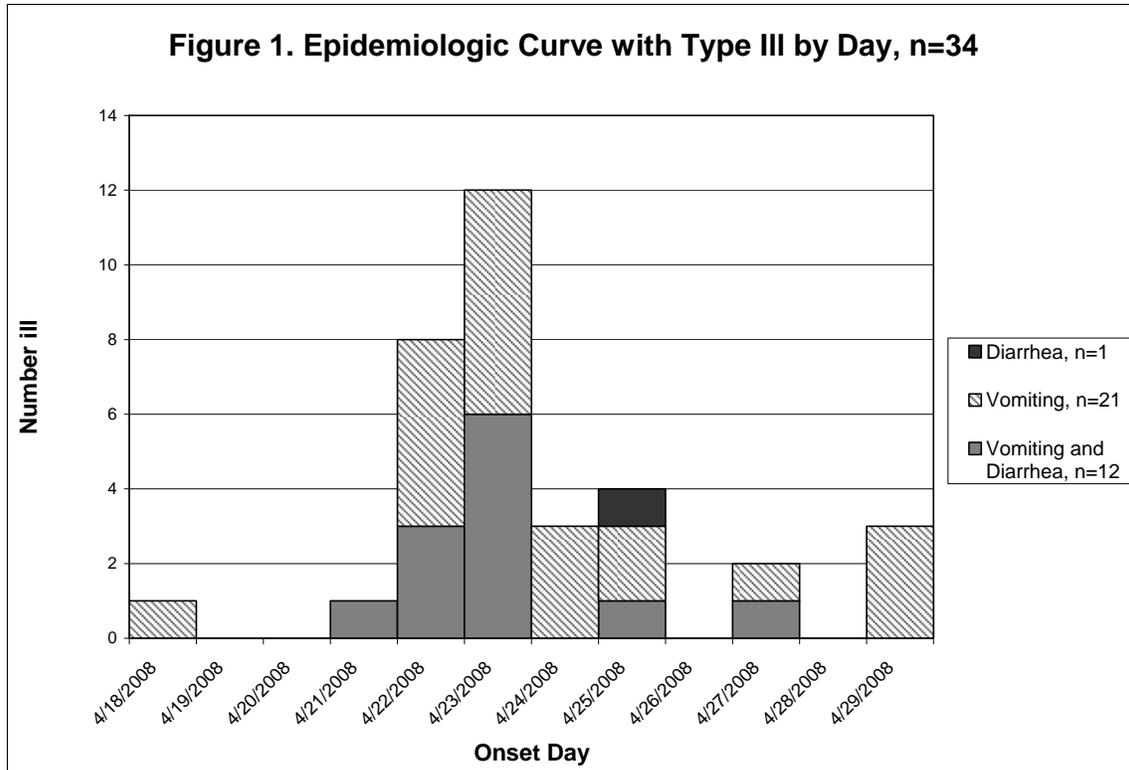


Table 2 shows the numbers and percentages of symptoms reported among all those who met the case definition and completed surveys. Of those who met the case definition, 21 (62%) had vomiting but no diarrhea, 12 (35%) had vomiting and diarrhea and 1 (3%) had diarrhea but no vomiting. The median duration of illness was two days.

**Table 2. Symptoms reported among survey respondents who met the case definition**

Symptom	n=34	% among ill
Vomiting	33	97
Nausea	28	82
Stomach Cramps	27	79
Diarrhea	13	38
Fever	10	29
Bloody Diarrhea	0	0

*Environmental*

During the food service investigation of the Haven Elementary kitchen, no violations were observed. The kitchen was not in full operation at the time of inspection.

Two violations were noted in the Annual School Sanitation Inspection Report. One involved no hot water at sinks in some classrooms and gym restrooms. The other involved an unlocked storage closet for chemicals.

### *Laboratory*

Both stool specimens collected tested positive for norovirus genotype I. The samples were forwarded to the Minnesota Public Health Laboratories for sequencing. Both samples had the same genome sequence.

### **Conclusion**

An outbreak of norovirus occurred at Haven Elementary. Of the students and staff who completed the survey, 34 students met the case definition of vomiting and/or diarrhea between Monday, April 21 and Friday, April 25. No staff reported becoming ill. This number is less than half of what was originally reported. Kindergarten and grade five appear to have had the highest percentage ill with 40% of those who returned surveys. Both sexes had the same number of ill from the surveys, but males had a lower response rate, giving them a higher attack rate of 35% versus the female attack rate of 27%.

Due to the limited number of surveys returned 112, any statistical analysis of the foods or meals involved would not generate enough power to be useful, therefore no associations with food were calculated.

Noroviruses are the leading cause of gastroenteritis in the United States; an estimated 23 million people are infected with Norovirus every year.<sup>1,2</sup> Onset of diarrhea and vomiting are common 12-48 hours after infection, and may last from 12 to 60 hours. Vomiting is more prevalent in children than adults. Transmitted primarily through the fecal-oral route, Norovirus particles may be spread through direct contact or through consuming fecally-contaminated food or water<sup>1,2</sup>. Results from outbreak investigations have also suggested that spread via aerosolized vomitus is possible. Because Noroviruses are highly contagious, requiring less than 100 organisms for infection, transmission may occur via hand-to-mouth activities following the handling of materials, fomites, and environmental surfaces contaminated with feces or vomitus<sup>3</sup>.

### **Limitations**

Limitations of this study include small sample size and potential reporting bias. The investigators relied on the staff and parents of students to complete the survey. Since 41% of students and 2 teachers completed the survey, the investigators cannot say what the overall attack rate was or if kindergarten and fifth grade had the highest attack rates. The report was also limited by recall bias as information was gathered by surveys, which required students, staff and parents of students to recall meals a week or more prior to the survey.

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<sup>1</sup> Fankhauser RL, Monroe SS, Noel JS, et al. Epidemiologic and molecular trends of "Norwalk-like viruses" associated with outbreaks of gastroenteritis in the United States. *J Infect Dis* 2002;186:1--7.

<sup>2</sup> Turcios RM, Widdowson MA, Sulka AC, Mead PS, Glass RI. Reevaluation of epidemiological criteria for identifying outbreaks of acute gastroenteritis due to norovirus: United States, 1998--2000. *Clin Infect Dis* 2006;42:964--9.

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*As the state's environmental protection and public health agency, KDHE promotes responsible choices to protect the health and environment for all Kansans.*

*Through education, direct services, and the assessment of data and trends, coupled with policy development and enforcement, KDHE will improve health and quality of life. We prevent injuries, illness, and foster a safe and sustainable environment for the people of Kansas.*